ACC NR: AP7001314

energy transfer between the ions. The authors thank N. G. Basov for discussing the problem. Orig. art. has: 2 figures and 28 formulas. [YK]

SUB CODE: 20/ SUBM DATE: 31May66/ ORIG REF: 003/ OTH REF: 010/
ATD PRESS: 5110

Card 2/2

ACC NR: AP7003209 SOURCE CODE: UR/0056/66/051/006/1669/1675

AUTHOR: Ambartsumyan, R.V.; Kryukov, P.G.; Letokhov, V.S.

ORG: Physics Institute im. P.N. Lebedev, Academy of Sciences SSSR (Fizicheskiy institut Akademii nauk SSSR)

TITLE: Dynamics of spectral line narrowing in a nonresonant feedback laser

SOURCE: Zh eksper i teor fiz, v. 51, no. 6, 1966, 1669-1675

TOPIC TAGS: solid state laser, ruby laser, ~~nonresonant feedback laser~~, laser ~~output~~ emission

ABSTRACT: The authors proceed from rate equations for the spectral density of the photons and for the density of the active particles. The time-dependent line width $\Delta\nu$, is expressed in terms of exact solutions through numerical integration, and also in terms of a simplified formula which shows that $\Delta\nu$, after an initial transient-state period, grows roughly as $k/\sqrt{E}$ (k—threshold gain per pass), i.e., much more slowly than in lasers with resonant feedback. The experimental part of the paper deals with the

Card 1/2 UDC: none

ACC NR: AP7003209

spectral analysis of the emission of a nonresonant feedback ruby laser by the method of the Fabry-Perot interferometer and the rotating-mirror spectrograph. The parameters of this laser were described earlier (Ambartsumyan, R. V., N. G. Basov, P. G. Kryukov, V. S. Letokhov. ZhETF, PvR, 3, 1966, 262; ZhETF, v. 51, no. 2, 1966, 724). The observed values of the spectral width are shown to confirm the theory. White paper and magnesium oxide were used as surface scatterers, and smoke and sulfur hydrosols were used as volume scatterers. With smoke the threshold gain per pass k was naturally very high, and narrowing (to 0.03 cm^{-1}) occurred quite rapidly (in 100—300 μsec).

SUB CODE: 20/ SUBM DATE: 19Jul66/ ORIG REF: 005/ OTH REF: 005
ATD PRESS: 5113

2/2

SOURCE CODE: UR/0056/67/052/001/0282/0292

ACC NR: AP7006151

AUTHOR: Letokhov, V. S.; Suchkov, A. F.

ORG: Physics Institute im. P. N. Lebedev, Academy of Science, SSSR (Fizicheskiy institut Akademii nauk SSR)

TITLE: Dynamics of generation of a giant coherent light pulse, II.

SOURCE: Zhurnal eksperimental'noy i teoreticheskoy fiziki, v. 52, no. 1, 1967, 282-292

TOPIC TAGS: ~~giant pulse laser~~ Q switched laser, laser theory, LIGHT PULSE, LASER PULSATION

ABSTRACT: This paper is a continuation of an earlier work by the authors (ZhETF, v. 50, no. 4, 1966, 1148) on the space-time evolution of a giant light pulse from a Q-switched laser. In the present paper, a theoretical analysis is made of the formation of a "jet" in the linear generation region, its dependence on the initial field intensities, and the transverse development of generation in the nonlinear region. The effect of inhomogeneities of the reproductive index of a medium inside the cavity on the dynamics of generation of a giant pulse is considered. The postulated existence of a transverse development of a giant pulse was recently confirmed experimentally by R. V. Ambartsumyan et al. (ZhETF, 51, 1966, 406) and

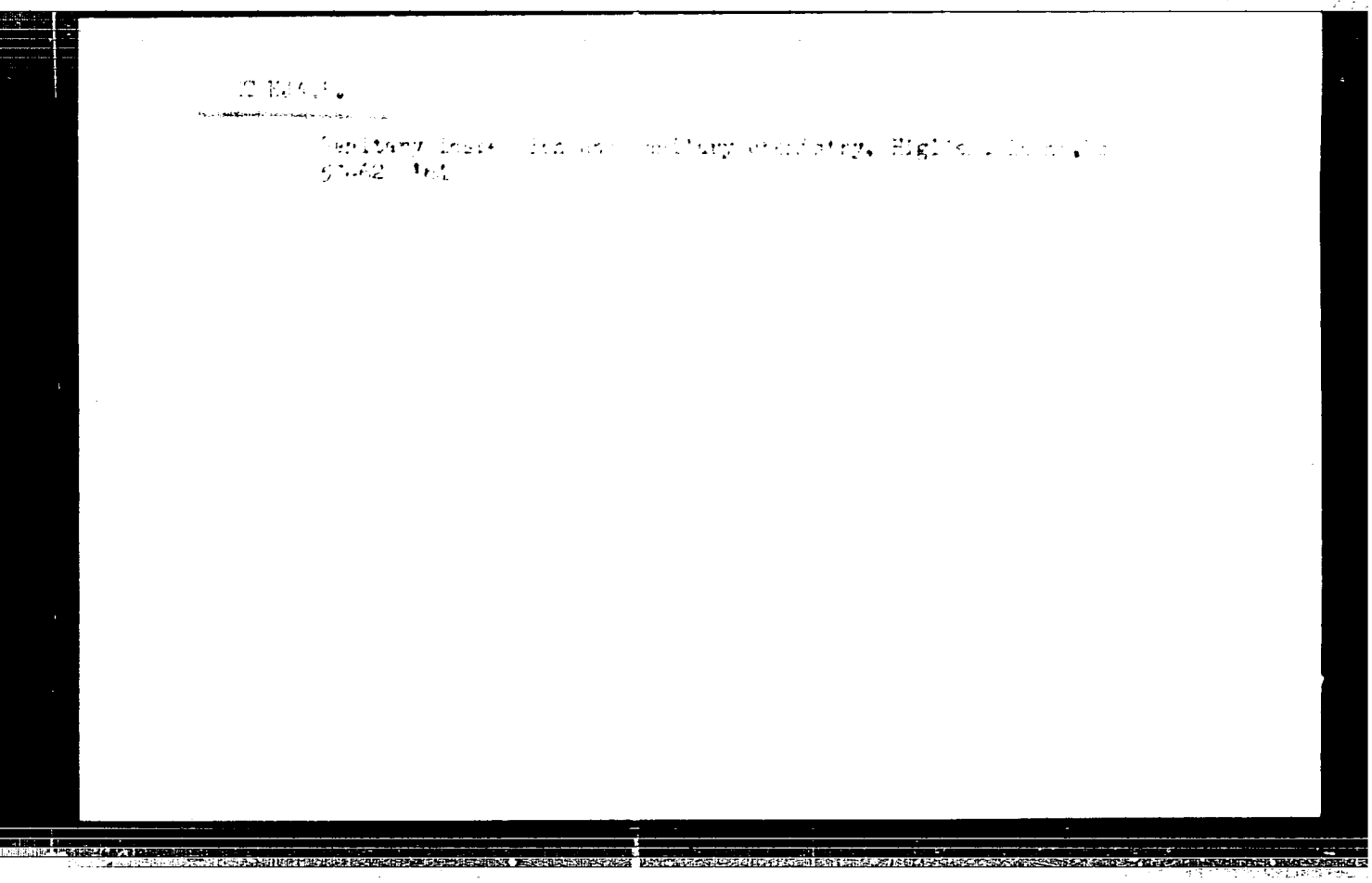
UDC: none

Card 1/2

V. V. Korobkin et al. (ZhETF, PvR, 3, 1966, 301). The effect was also substantiated by Ambartsumyan et al. (ZhETF, PvR, 4, 1966, 19) in connection with the propagation of a giant pulse in a nonlinear medium. Recommendations are made for the construction of giant pulse lasers with an extremely short pulse duration and minimal beam divergence. Orig. art. has: 6 figures and 27 formulas. [YK]

SUB CODE: 20/ SUBM DATE: 06Aug66/ ORIG REF: 008/ OTH REF: 002/ ATD PRESS: 5116

Card 2/2



ALRODOV, Vladimir Aleksandrovich, kand. geol.-miner. nauk, dots.;
LETOVA, I.L., red.

[Recent tectonics, volcanic areas, and large seismic belts of the world] Neotektonika, vulkanicheskie provintsii i velikie seismicheskie poiasa mira. Moskva, Izd-vo Mosk. univ., 1965. 220 p. (MIRA 18:12)

LETONMYAKI, M.N.

The composition of oleoresin extracted from old pine stumps. N. F. Komshilov, M. N. Letonmyaki, and L. I. Spirkova. *Lesokhim. Prom.* 3, No. 1, 11-12(1954).—The resin content of pine stumps, over 30 years in the ground, were studied. The samples contained (values for both samples given in all cases) 79.9-84.7% bone-dry and resin-free wood, 12.2-7.1% rosin (I), and 8.5-7.7% H_2O. The extd. I was 48.2-49.3% petr. ether insol. and 28.6-27.6% Et_2O insol. The I was divided into 3 groups: (A) saponif. with 5% Na_2CO_3 (64.6-69.1%, (B) with 5% NaOH in H_2O (18.6-15.7%), and (C) with 5% NaOH in EtOH (16.8-15.3%), and each group was divided into neutral substances (II), fatty acids (III), and resin acids (IV). III and IV in A was 4.83-8.56 and 59.7-60.5%; and in B was 2.2-2.7 and 16.3-13.0% II, III, and IV in C was 9.72-7.43, 2.58-2.09, and 4.56-4.81%. Comparable values for A (80.7%), B (6.1%) and C (12.0%) from a standard rosin were 9.85 and 70.81% III and IV in A and 1.10 and 5.17 in B, and 8.52% II 2.81% III, and 1.7% IV in C. John Lake Kc

Lab Wood Chem., Karelo Finnish Affil, AS USSR

KOMSHILOV, N.F.; LETOMMYAKI, M.N.

Causes of deposit precipitation in evaporators. Bum.prom.30 no.3:5-8 Mr '55. (MLRA 8:4)

1. Karelo-Finskiy filial Akademii nauk SSSR.
(Evaporating appliances)(Cellulose)(Lignin)

LETONMYAKI, M.N.; KOMSHILOV, N.F.

Composition of black cellulose lyes and the process of lignin dissolution. Izv. Kar. i Kol'. fil. AN SSSR no.2:158-165 '58.
(MIRA 11:9)

1.Laboratoriya lesokhimii Karel'skogo filiala AN SSSR.
(Karelia--Woodpulp industry)

LETONMYAKI M.N.; KOMSHILOV, N.F.; DZHURINSKAYA, N.G.

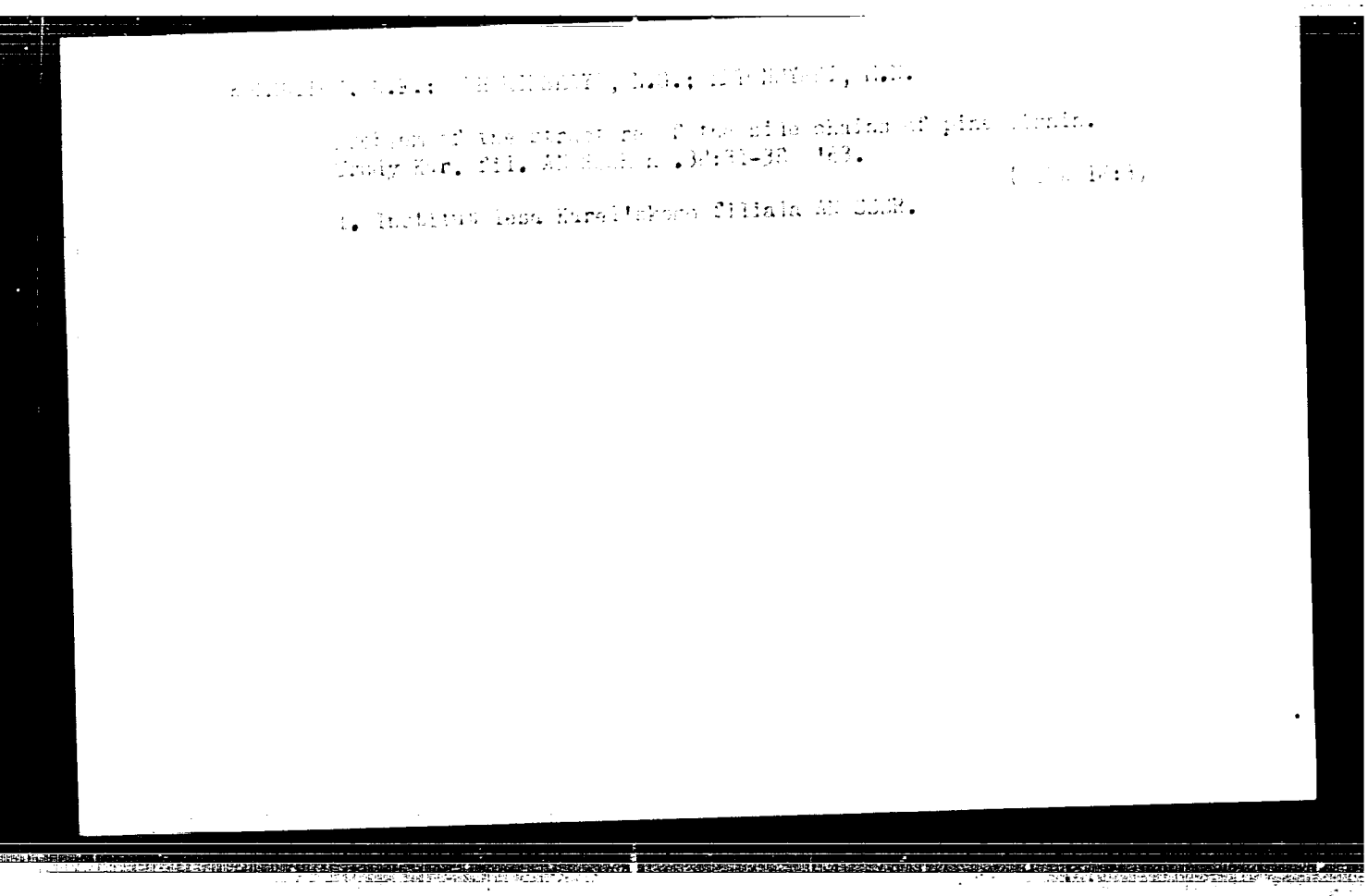
Composition of the organic part of black liquor. Izv.Kar. i Kol'.fil.AN SSSR no.4:138-145 '58. (MIRA 12:5)

1. Laboratoriya lesokhimii Karel'skogo filiala AN SSSR.
(Woodpulp industry)

KOMSHILOV, N.F.; LETONMYAKI, M.N.; PROKHOROV, A.V.; YEFISHEV, I.I.

Ways and methods for reducing the amount of sulfuric acid used in producing tall oil from sulfate soap. Izv. Kar. i Kol' fil. AN SSSR no.1:151-155 '59. (MIRA 12:9)

1.Laboratoriya lesokhimii Karel'skogo filiala AN SSSR i Nauchno-issledovatel'skiye gruppy Pitkyarantskogo sul'fatnogo zavoda i Segezhskogo tsellyulozno-bumazhnogo kombinata.
(Sulfuric acid) (Tall oil)



L 39716-65

ACCESSION NR: AP5011724 UR/0080/64/037/011/2487/2492

AUTHOR: Komshilov, N. F.; Dzhurinskaya, N. G.; Letonmyaki, M. N.

TITLE: Structure of the side chains of pine lignin

SOURCE: Zhurnal prikladnoy khimii, v. 37, no. 11. 1964, 2487-2492

TOPIC TAGS: plant chemistry, redox reaction, forest product

ABSTRACT: Continuing their previous studies, the authors endeavored to obtain supplementary evidence that oxidation-reduction processes take place in pine lignin during extraction from wood. Sulfate lignin, hydrolyzed lignin purified by treatment with a copper amine solution, and copper amine lignin produced from pine shavings were characterized. Comparing their results with literature data, the authors concluded that the side chains of the pine lignin, both natural and modified by isolation from the wood, and those of spruce lignins are constructed analogously. It was demonstrated that during sulfate digestion of wood, the side chains of lignin are modified by oxidation-reduction processes. Orig. art. has: 7 formulas and 4 tables.

Card 1/2

L 39716-65

ACCESSION NR: AP5011724

ASSOCIATION: Institut lesa Karel'skogo filiala AN SSSR (Forest Institute of the Karelian Branch, AN SSSR)

SUBMITTED: 26Nov62	ENCL: 00	SUB CODE: LS, GC
NO REF SOV: 012	OTHER: 010	JPRS

Card 2/2 pb

KOMSHILOV, N.F.; PILYUGINA, L.G.; LETONMYAKI, M.N.; SELIVANOVA, T.A.

Volatile acids from black liquors of the sulfate cellulose production. Zhur.prikl. khim. 38 no.3:650-657 Mr '65. (MIRA 18:11)

1. Karel'skiy filial AN SSSR, Institut lesa. Submitted Febr. 11, 1963.

LETOSHNEV, M. N.

29119 O Nemgnovennykh Udakakh. (K Teorii Klavishnykh Solomotryasov.) Sbornik nauch. -- Tekhn. Rabot(Leningr. In-T Mekhanizatsii Sel. Khoz.-Va.) vi, 1949, s. 3-18

SO: Letopis' Zhurnal'nykh Statey, Vol. 39, Moskva, 1949

Sel'skokhozyaystvennyye Mashing; Teoriya, Raschet, Proyektirovaniye I Ispytaniye (Farm Machinery; Theory, Accounting, Planning and Testing) Izd. 3, Perer. I Dop. Moskva, Sel'khozgiz, 1955.

764 P. Diagrs.

Bibliographical Footnotes.

LETOSHNEV, M.N., pochetnyy akademik

Theory of the stalk-turning apparatus of the SKU-2,1 combine. Mekh. i elek.sots.sel'khoz. no.5:14-22 '56. (MIRA 12:4)

1. Leningradskiy sel'skokhozyaystvennyy institut i Vsesoyuznaya akademiya sel'skokhozyaystvennykh nauk im. Lenina.
(Combines (Agricultural machinery))

GRIGOR'YEV, Sergey Mikhaylovich; LUR'YE, Abram Bentsianovich; MEL'NIKOV, Sergey Vsevolodovich; LETOSHNEV, M.N., professor, doktor tekhnicheskikh nauk, redaktor; CHAPSKIY, O.U., redaktor; MOLODTSOVA, N.G., tekhnicheskiy redaktor

[Agricultural machinery and implements; laboratory work, home assignments, course work and diploma projects] Sel'skokhoziaistvennye mashiny i orudiia; laboratornye raboty, domashnie zadaniia, kursovye raboty i diplomnoe proektirovanie. Pod red. M.N.Letoshneva. Moskva, Gos.izd-vo sel'khoz.lit-ry, 1957. 383 p. (MLRA 10:10)
(Agricultural machinery)

LETOSHNEV, M.N., pochetnyy akademik

Mechanization of agriculture and the theory of machinery. Mekh. i elk. sots. sel'khoz. 15 no.2:6-12 '58. (MIRA 11:5)

1. Vsesoyuznaya akademiya sel'skokhozyaystvennykh nauk im. V.I. Lenina.
(Agricultural machinery)

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Translation from: Referativnyy Zhurnal Fizika, 1959, Nr 4, p 210 (USSR)

AUTHOR: Letoshneva, T.M.

TITLE: On the Limits of Beam Swinging in a Linear Radiator System

PERIODICAL: Tr. Leningr. in-ta aviats. priborostr., 1958, Nr 18, pp 79 - 94

ABSTRACT: The deflection of the maximum in the directional diagram for a linear dipole array with uniform excitation depends on the phase shift between the dipoles. The author of the present article calculates this dependence. The swinging of the beam is confined within certain limits by the appearance of a second radiation maximum. The author plots a curve showing the width of the major lobe for antennae 10 and 20 λ long as a function of the angle of deflection of the maximum. The asymmetry of the major lobe is noted. The author points out that when the dipole array is fed from a single feeder, the angle of deflection of the curve does not depend on the distance between the dipoles. The optimum distance between dipoles excited in antiphase is 0.577 λ ; for wave-guide excitation this affords the possibility of swinging the diagram from 0° to 60° by varying the distance between the wave-guide walls. B.Ye. Kinber

Card 1/1

BERAN, I; KECOVA, H.; LETOSNIK, V.

Insulin resistant diabetes; clinical aspects. Cas.lek.cesk. 90 no.1:6-11 5 Jan 51. (CLML 20:6)

1. Of the First Internal Clinic (Acting Head--Prof.V.Jonas, M.D.).

[redacted], V., [redacted], F., [redacted], V.

"Primary cancer of the small intestine." p. 261. (CASOPIS LEAKARU CESKYCH, Vol. 92, #10, Mar. 1953, Czechoslovakia)

SO: East European Monthly List of Russian Accessions, Vol. 2, #8 Library of Congress, August 1953, Uncl.

PROCHAZKA, Jos., Dr.; JIRSA, M., Dr.; LETOSNIK, V., Dr.; MAYER, K., Dr.; BRAUN, A., dr., Path. cast zpracoval.

Studies on the problem of generalized periostoses; hyperostosis generalisata with Uehlinger's pachydermia. Acta chir. orthop. traum. cech. 23 no.6:302-310 Nov 56.

1. I. interni klinika SFN v Praze, predn. prof. Dr. M. Netousek--II. klinika pro orthopedickou a detskou chirurgii v Praze, predn. prof. Dr. O. Hnevkovsky--I. patologicko-anatomicky ustav KU v Praze. J. P., Praha 10. Zahradni mesto, cp. 1325.

(OSTEOARTHROPATHY, HYPERTROPHIC PULMONARY, complications, Uenlinger's pachydermia (Cz))

(SKIN DISEASES, complications, Uehlinger's pachydermia in hypertrophic pulm. osteoarthropathy (Cz))

LETOSNIKOVA, L.

Modern ornaments in textile printing. (To be contd.)

P. 220, (Textil) Vol. 12, no. 6, June 1957, Praha, Czechoslovakia

SO: Monthly Index of East European Acessions (EEAI) Vol. 6, No. 11 November 1957

LETOV, A.

Regularly and profitably carry out the air transport plan.
Grazhd. av. 12 no.5:1-3 My '55. (MLRA 8:9)

1. Nachal'nik Politicheskogo upravleniya Grazhdanskogo vozdushnogo flota.
(Aeronautics, Commercial--Freight)

LETOV, A.

Persistent improvement of party and political work. Grazhd.av. 12 no.1: 4-6 Ja '55. (MIRA 16:3)

1. Nachal'nik Politicheskogo upravleniya Grazhdanskogo vozdushnogo flota.

(Communist Party of the Soviet Union—Party work)

KRASOVSKIY, N.N.; LETOV, A.M.

Concerning the theory of the analytical design of controllers. Avtom. i telem. 23 no.6:713-720 Je '62. (MIRA 15:6)
(Automatic control)

MATVEYEV, Nikolay Mikhaylovich; LETOV,B.D., redaktor; YEGUDIN,N.P., professor, doktor fiziko-matematicheskikh nauk, redaktor; GATAULLINA,A.S., tekhnicheskiy redaktor

[Methods of integrating ordinary differential equations] Metody integrirovaniia obyknovennykh differentsial'nykh uravnenii. [Leningrad] Izd-vo Leningradskogo univ., 1955. 655 p.

(Differential equations) (MIRA 9:3)

IETOV, A., elnok

The first international congress on automation of the IFAC. Mekh automat 8 no.5:158 '60.

1. IFAC.

LETOV, A. M.
letov, a.m.

"On the Problem of Automatic pilots" Vestnik mosk-gos Univ, No 1, 1946

LETOV, A.M.

Regulirovanie statsionarnogo sostoianiia sistemy, podverzhennoi deistviiu postoiannykh vozmushchaiushchikh sil. (Prikladnaia matematika i mekhanika, 1948, v. 12, no. 2, p. 149-156, diagrs., bibliography)

Title tr.: Control of the stationary state of a system subjected to constant perturbing forces.

Reviewed by S. Lefschetz in Applied Mechanics Reviews, 1950, no. 25.

QA801.P7 1948

SO: Aeronautical Sciences and Aviation in the Soviet Union, Library of Congress, 1955

LETOV, A. M.

3800

Letov, A. M. On the theory of an isodromic regulator. Akad. Nauk SSSR. Prikl. Mat. Meh. 12, 363–368 (1948). (Russian)

The circuit equations lead to nonlinear differential equations where the nonlinear terms have small parameters as coefficients. The Poincaré method is applied to obtain periodic solutions. *R. Bellman.*

Source: Mathematical Reviews, Vol 10 No. 2

LETOV, A.M.

Letov, A. M. On a special case in the investigation of the stability of a system of regulation. Akad. Nauk SSSR Prikl. Mat. Meh. 12, 729–736 (1948). (Russian)

The system $dx_s/dt = \sum_{i=1}^{N} a_{si}x_i + c_s y$, $s = 1, 2, \ldots, N$, $dy/dt = f(\sigma)$, $\sigma = \sum_{i=1}^{N} l_i x_i - y$, is investigated, where $f(\sigma)$ is continuous and bounded for all σ, satisfying $\sigma f(\sigma) > 0$, $\sigma \neq 0$. By a series of transformations and a generalization of a method of Liapounoff, it is shown how the stability or instability of the solutions can be decided by certain expressions involving the coefficients a_{ij}, c_i, l_i.

R. Bellman (Stanford University, Calif.)

Source: Mathematical Reviews, Vol 10 No. 7

LETOV, A M

Letov, A. M. Strictly unstable regulating systems. Akad. Nauk SSSR. Prikl. Mat. Meh. 14, 183–192 (1950) (Russian)

The author considers the stability of the system

$$\eta_i = \sum_{\alpha=1}^{n} \delta_{i\alpha}\eta_\alpha + m_i\xi, \quad \xi = f(\sigma), \quad \sigma = \sum_{\alpha=1}^{n} l_\alpha\eta_\alpha - l$$

by the method of Lur'e [Appl. Math. Mech. [Akad. Nauk SSSR. Prikl. Mat. Mech.] 9, 353–367 (1945); these Rev. 7, 300]

J. G. Wendel (New Haven, Conn.)

Source: Mathematical Reviews, Vol 11 No. 9

LETOV, A. M.

PA 193T51

USSR/Mathematics - Servomechanics Sep/Oct 51

"Limiting Values of Least Characteristic Number (Eigenvalue) of a Certain Type of Regulated Systems," A. M. Letov, Inst of Automatics and Telemech, Acad Sci USSR

"Prik Matem i Mekh" Vol XV, No 5, pp 591-600

Discussed problem directly affects quality of regulation. In this particular case it is expressed as problem of least characteristic number (eigenvalue) of specified regulating system (cf. A. M. Lyapunov, "General Problem of Stability

193T51

USSR/Mathematics - Servomechanics (Contd) Sep/Oct 51

of Motion"; N. G. Chetayev, "Stability of Motion," 1946). Although problem is not general, this particular case is applied to study of linear regulated systems (cf. Tsypkin and Bromberg, "Trudy NISO," No 9, 1946; B. V. Bulgakov; "Oscillations," 1949). Submitted 8 Feb 51.

193T51

Mathematical Reviews
Vol. 14 No. 8
Sept. 1953
Mechanics.

Letov, A. M. On the theory of gyrosemicompasses. Akad. Nauk SSSR. Inženernyĭ Sbornik 13, 123-130 (1952). (Russian)

A gyrosemicompass is an astatic gyroscope with three degrees of freedom whose axle is kept near the plane of the horizon. It is designed for stabilization of an arbitrarily chosen azimuth direction during a given time interval. Let $O\xi\eta\zeta$ be a right-hand orthogonal trihedral whose η-axis is oriented in the direction to be stabilized and whose ζ-axis points to the zenith of the observer. Let $Oxyz$ be the Resal trihedral with the z-axis along the axle and pointing in the sense of positive values for the kinetic moment H of the gyroscope, and with the x-axis along the axis of the inner Cardan ring. Further, denote by M_x, M_y the moments of the exterior forces acting along the x-, y-axes respectively. Assume that in the initial position of the gyroscope at the instant $t = 0$ the z-, η-axes, the y-, ζ-axes and the positive x-axis and the negative ξ-axis coincide. After elapse of a certain time interval a deviation of the gyroscope from the chosen direction will appear. This deviation can be characterized by two angles α and β, where β is the angle between

(OVER)

the z-axis and its projection on the $\xi\eta$-plane, and α is the angle between this projection and the η-axis. The basic problem in the theory of gyrosemicompasses is to express the angles α, β as functions of the time.

The author considers two cases: (i) the free gyroscope ($M_x = M_y = 0$); and (ii) the Anschütz azimuth gyroscope under the action of the moment of gravity

$$M_x = m_1 g l_1 \cos\beta = k_1 H \cos\beta$$

of a mass m_1 at the distance l_1 on the north end of the axle, and of the moment of gravity $M_y = m_2 g l_2 \sin\beta$ of a mass m_2 at the distance l_2 on the negative y-axis, the moments of the friction forces being neglected. In case (i) the author shows that any direction, determined by α_0, β_0, can be sufficiently accurately fixed by the axle of a gyroscope if the time t^* of observation is sufficiently small; the accuracy with which the chosen direction is indicated is determined by the deviations $\alpha(\alpha_0, \beta_0, t^*)$ and $\beta(\alpha_0, \beta_0, t^*)$. In case (ii) the following theorems are proved. Theorem 1. At any latitude φ and for arbitrary α_0, β_0 the axle of an azimuth gyroscope, free of friction forces, performs a regular conical precession with period T (depending on φ, diurnal rotation U of the Earth, α_0, β_0 and the parameter $k_2 = m_2 g l_2 / H$) and well-defined maximum deviations for α and β. Theorem 2. For the given latitude φ the set of all azimuth directions for which the Anschütz gyroscope admits deviations not exceeding the given value α^* fills up a sector of angle α^* around the meridian of observation. *E. Leimanis* (Vancouver, B. C.).

LETOV A. M.

Letov A. M., "Reliability of Regulating Systems with Two Activating Organs," Prikladnyye matematika i mekhanika, 1953, Volume XIV, No 4, Pages 401-410.

LETOV, A. M.

"Theory of Characteristics of Nonlinear Regulated Systems", Avtomatika i Telemekhanika, Vol 14, No 5, 1953, pp 588-596.

Discusses a class of nonlinear regulated systems, described by the equations

$$\dot{\eta}_K = \sum_{\alpha=1}^{n} b_{K\alpha}\eta_\alpha + r_K\varepsilon \quad (K = 1, \ldots, n)$$

$$\dot{\xi} = f(\sigma) \qquad \sigma = \sum_{\alpha=1}^{n} p_\alpha \eta_\alpha - \varepsilon$$

where $b_{K\alpha}$, r_K and p_α are constant parameters, and $f(\sigma)$ is a limited, single-valued and continuous function (but the exception may be in the point $\sigma = 0$), possessing properties $f(0) = 0$ and $\sigma f(\sigma) > 0$ at $|\sigma| > 0$.

On the basis of N. G. Chetayev's method, established for cases of linear systems (Prikladnaya Matematika i Mekhanika, Vol 15, No 3, 1951) a region of parameter values is found for which the damping rate process, described in the aforementioned system, will be at its maximum. (RZhMekh, No 11, 1954). SO: Sum. No. 443, 5 Apr. 55

Letov, A.M.

1/2

Letov, A. M. Stability of control systems with two regulating organs. Akad. Nauk SSSR. Prikl. Mat. Meh. 17, 401–410 (1953). (Russian)

The equations describing the control system with two regulating organs are

$$\dot{\eta}_k = \sum_{j=1}^{n} b_{kj}\eta_j + n_{k1}\xi_1 + n_{k2}\xi_2 \quad (k = 1, \cdots, n),$$

(a)

$$\xi_i = f_i(\sigma_i), \quad \sigma_i = \sum_{j=1}^{n} p_{ij}\eta_j - r_{i1}\xi_1 - r_{i2}\xi_2 \quad (i = 1, 2),$$

where η_k are the controlled coordinates, ξ_i the coordinates of the regulating organs, $f_i(\sigma)$ given continuous functions describing the action of the servomotors, $f_i(0) = 0$, $\sigma f_i(\sigma) > 0$. If one assumes the zeros ρ_k of $|b_{kj} + \delta_{kj}s|$ are distinct, a linear transformation $\eta = \varkappa x$ reduces (a) to the canonical form

$$\dot{x}_k = -\rho_k x_k + u_{k1} f_1(\sigma_1) + u_{k2} f_2(\sigma_2),$$

(b)

$$\dot{\sigma}_i = \sum_{j=1}^{n} \beta_{ij} x_j - r_{i1} f_1(\sigma_1) - r_{i2} f_2(\sigma_2),$$

OVER

Letov, A M.

2/2

where the u_{ij}, β_{ij} are easily expressed in terms of the coefficients of (a).

System (a) is said to be absolutely stable if the solution $\eta_k = \xi_i = 0$ is asymptotically stable no matter what the perturbations and the functions f_i are. The author establishes sufficient conditions for the absolute stability of (a), extending a criterion of Lur'e [see the book reviewed above] which applies to systems with one regulating organ. One set of sufficient conditions is: $\mathrm{Re}\,\rho_k > 0$, $r_{11} > 0$, $4r_{11}r_{22} > (r_{12} + r_{21})^2$ and the system of equations quadratic in the a_k

$$\beta_{ik} + 2a_k \sum_{j=1}^{n} \frac{a_j u_{ji}}{\rho_j + \rho_k} = 0 \quad (k = 1, \cdots, n; i = 1, 2)$$

has a solution with as many real and conjugate complex a_k as there are real and conjugate complex numbers among the ρ_k. The conditions are proved by exhibiting a "Liapounoff function" $V(x, \sigma)$ which is positive for all values of x, $\sigma \neq 0$ and whose time-derivative is negative for all functions $x(t)$, $\sigma(t) \neq 0$ satisfying (b). *M. Golomb.*

LETOV A.M.

SOLODOVNIKOV, V.V.; professor, doktor tekhnicheskikh nauk, redaktor; AYZERMAN, M.A., doktor tekhnicheskikh nauk; BASHKIROV, D.A., kandidat tekhnicheskikh nauk; BROMBERG, P.V., kandidat tekhnicheskikh nauk; VORONOV, A.A., kandidat tekhnicheskikh nauk, dotsent; GOL'DFARB, L.S., doktor tekhnicheskikh nauk, professor; KAZAKEVICH, V.V., doktor tekhnicheskikh nauk; KRASOVSKIY, A.A., kandidat tekhnicheskikh nauk, dotsent; LERNER, A.Ya., kandidat tekhnicheskikh nauk; LETOV, doktor, doktor fiziko-matematicheskikh nauk; professor; MATVEYEV, P.S., inzhener; MIKHAYLOV, F.A., kandidat tekhnicheskikh nauk; PETROV, B.N.; PETROV, V.V., kandidat tekhnicheskikh nauk; POSPELOV, G.S., kandidat tekhnicheskikh nauk, dotsent; TOPCHEYEV, Yu.I., inzhener; ULANOV, G.M., kandidat tekhnicheskikh nauk; KHRAMOY, A.V., kandidat tekhnicheskikh nauk; TSYPKIN, Ya.Z. doktor tekhnicheskikh nauk, professor; LOSSIYEVSKIY, V.L., doktor tekhnicheskikh nauk, professor, retsenzent; TIKHONOV, A.Ya., tekhnicheskiy redaktor

[Fundamentals of automatic control; theory] Osnovy avtomaticheskogo regulirovaniia; teoriia. Moskva, Gos. nauchno-tekhn. izd-vo mashinostroit. lit-ry, 1954. 1116 p. (MLRA 8:2)

1. Chlen-korrespondent AN SSSR (for Petrov, B.N.)
(Automatic control)

LETOV, A.

USSR

3

Duvakin, A. P., and Letov, A. M. On the stability of regulating systems with two organs of regulation. Akad. Nauk SSSR. Prikl. Mat. Meh. 18, 163-166 (1954). (Russian)

The systems under consideration are described by the equations

$$\text{(a)} \quad \dot{x}_i = \sum_{k=1}^{n} b_{ik}x_k + \sum_{j=1}^{s} u_{ij}\varphi_j\left(\sum_{k=1}^{n} g_{jk}x_k\right) \quad (i=1, \cdots, n),$$

where the b_{ik}, u_{ij}, g_{jk} are constants, the matrix (b_{ik}) has distinct characteristic values λ_i with $\operatorname{Re}\lambda_i<0$, the functions φ_j are continuous, $\varphi_j(0)=0$ and $y\varphi_j(y)>0$ for $y\neq 0$. The authors construct, by Malkin's method [Theory of stability of movement, Gostekhizdat, Moscow-Leningrad, 1952; these Rev. 15, 873] a Lyapunov function for system (a) from which they derive a sufficient condition for the asymptotic stability of its solutions. Also considered is the case where two of the λ_i are 0. *M. Golomb* (Lafayette, Ind.).

Aleksandr Mikhaylovich
Letov, A. M.

★ Letov, A. M. Ustoičivost' nelineinyh reguliruemyh sistem. [Stability of nonlinear control systems.] Gosudarstv. Izdat. Tehn.-Teor. Lit., Moscow, 1955. 312 pp. 8.20 rubles.

The purpose of this book is to acquaint "a wide circle of specialists working in the field of automata with the possibilities of effective utilization of the direct method of Lyapunov in the solution of the foremost problems in the theory of automatic control." It is also pointed out that the book should be helpful to students and "aspirants" in the field of automatic control and applied mechanics. The book is confined to the presentation of results obtained during the last decade by Russian investigators on the problems of the "absolute" stability and the degree of stability of control systems. By "absolute" stability is meant stability where a function which characterizes the regulator is not determined precisely but is known to belong to some class of functions. The largest such class of functions considered is the class (A)

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described below. All methods are based upon the First and Second Theorem of Lyapunov. These theorems give sufficient conditions for stability and asymptotic stability, and their application depends upon the construction or discovery of suitable positive definite functions. The major part of the book is devoted to special methods for the construction of positive definite quadratic forms suitable for the class of control systems being studied and to the illustration of these methods on specific examples. The differential equations of the control systems are of the following general type:

$$\dot{y}_k = \sum_{i=1}^{n} b_{ki} y_k + n_k u \quad (k = 1, \cdots, n),$$

$$V^{(n)} + W\dot{u} + Su = r(s),$$

$$s = \sum_{i=1}^{n} f_i y_i - ru.$$

The first equation is for the system being controlled,

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Letov, A.M.

and the second equation is that of the regulator. The parameters b_{ki}, a_k, V, W, p_k and r, are constants, though the non-stationary case is discussed briefly in Chapter XI. The function f may be nonlinear. The restrictions on f are: for some $s^* \geq 0$, $sf(s) > 0$ for $|s| < s^*$ and $sf(s) > 0$ for $|s| \geq s^*$, and f is continuous for $|s| \geq s^*$. The class of all such functions is the class (A) referred to above. The Chapter headings are: Introduction. I) Equation of a control system. Statement of the problem of stability. II) First canonical form of the equations of a control system. III) Second and third canonical forms. IV) Stability of control systems. V) Construction of simplified stability criteria. VI) Strictly unstable control systems. VII) Programmed control. VIII) Problem of quality of regulation. IX) Stability of control systems with dual regulators. X) Two special problems in the theory of control systems. XI) Stability of non-stationary motions.

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LETOV, A. M.

The principal example used to illustrate the methods is Bulgakov's equation: $T^2\ddot{s}+U\dot{s}+ks+y=0$, $u=f(s)$, and $s=ax+Ex+G^2\dot{x}=u$.

The book is a plain, unsophisticated and painstakingly thorough treatise on the application of Lyapunov's direct method. The mathematics required of the reader is elementary. The author's notations are cumbersome but possess the advantage to the person wishing to apply the results that the formulas are self-explanatory. No matrix canonical form theorems are used, and the transformation of the basic differential equations to the various canonical forms and the computation of the transformations are discussed in great detail. Most of this is, of course, consistent with the purpose for which the book was published. *J. P. LaSalle* (Notre Dame, Ind.).

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AYZERMAN, M.A., doktor tekhnicheskikh nauk, redaktor; VORONOV, A.A., kandidat tekhnicheskikh nauk, redaktor; KOGAN, B.Ya., kandidat tekhnicheskikh nauk, redaktor; KOTEL'NIKOV, V.A., kandidat tekhnicheskikh nauk, redaktor; LETOV, A.M., doktor fiziko-meditsinskikh nauk, redaktor; LOSSIYEVSKIY, V.L., doktor tekhnicheskikh nauk, redaktor; MEYEROV, M.V., doktor tekhnicheskikh nauk, redaktor; NAUMOV, B.N. redaktor; PETROV, B.N., redaktor; SOLODNIKOV, V.U, doktor tekhnicheskikh nauk, redaktor; TRAPEZNIKOV, V.A., redaktor; KHRAMOY, A.V., kandidat tekhnicheskikh nauk, redaktor; TSYPKIN, Ya.Z., doktor tekhnicheskikh nauk, redaktor; VORONOV, A.A., redaktor; PEVZNER, R.S., tekhnicheskiy redaktor.

[Proceedings of the Second All-Union Conference on the theory of automatic control] Trudy vtorogo Vsesoyuznogo soveshchaniia po teorii avtomaticheskogo regulirovaniia.

(Continued on next card)

AYZERMAN, M.A. doktor tekhnicheskikh nauk, redaktor (Cont'd) Card 2.

Vol.3 [Methods and means of experimental research on systems of automatic control. Bibliography on the theory of automatic control and related problems] Metody i sredstva eksperimental'nogo issledovaniia sistem avtomaticheskogo regulirovaniia. Bibliografiia po teorii avtomaticheskogo regulirovaniia i smezhnym voprosam. 1955. 351 p. (MLRA 9:1)

1. Chlen-korrespondent AN SSSR(for Petrov, Trapeznikov) 2. Vsesoyuznoye soveshchaniye po teorii avtomaticheskogo regulirovaniya 2d, Moscow, 1953.
(Automatic control) (Bibliography--Automatic control)

AYZERMAN, M.A., doktor tekhnicheskikh nauk, redaktor; VORONOV, A.A., kandidat tekhnicheskikh nauk, redaktor; KOGAN, B.Ya., kandidat tekhnicheskikh nauk, redaktor; KOTEL'NIKOV, V.A., kandidat tekhnicheskikh nauk, redaktor; LETOV, A.M., doktor fiziko-matematicheskikh nauk, redaktor; LOSSIYEVSKIY, V.L., doktor tekhnicheskikh nauk, redaktor; MEYEROV, M.V., doktor tekhnicheskikh nauk, redaktor; NAUMOV, B.N., redaktor; PETROV, B.N., redaktor; SOLODNIKOV, V.V., doktor tekhnicheskikh nauk, redaktor; TRAPEZNIKOV, V.A., redaktor; KHRAMOY, A.V., kandidat tekhnicheskikh nauk, redaktor; TSYPKIN, Ya.Z., doktor tekhnicheskikh nauk, redaktor; PEVZNER, R.S., tekhnicheskiy redaktor.

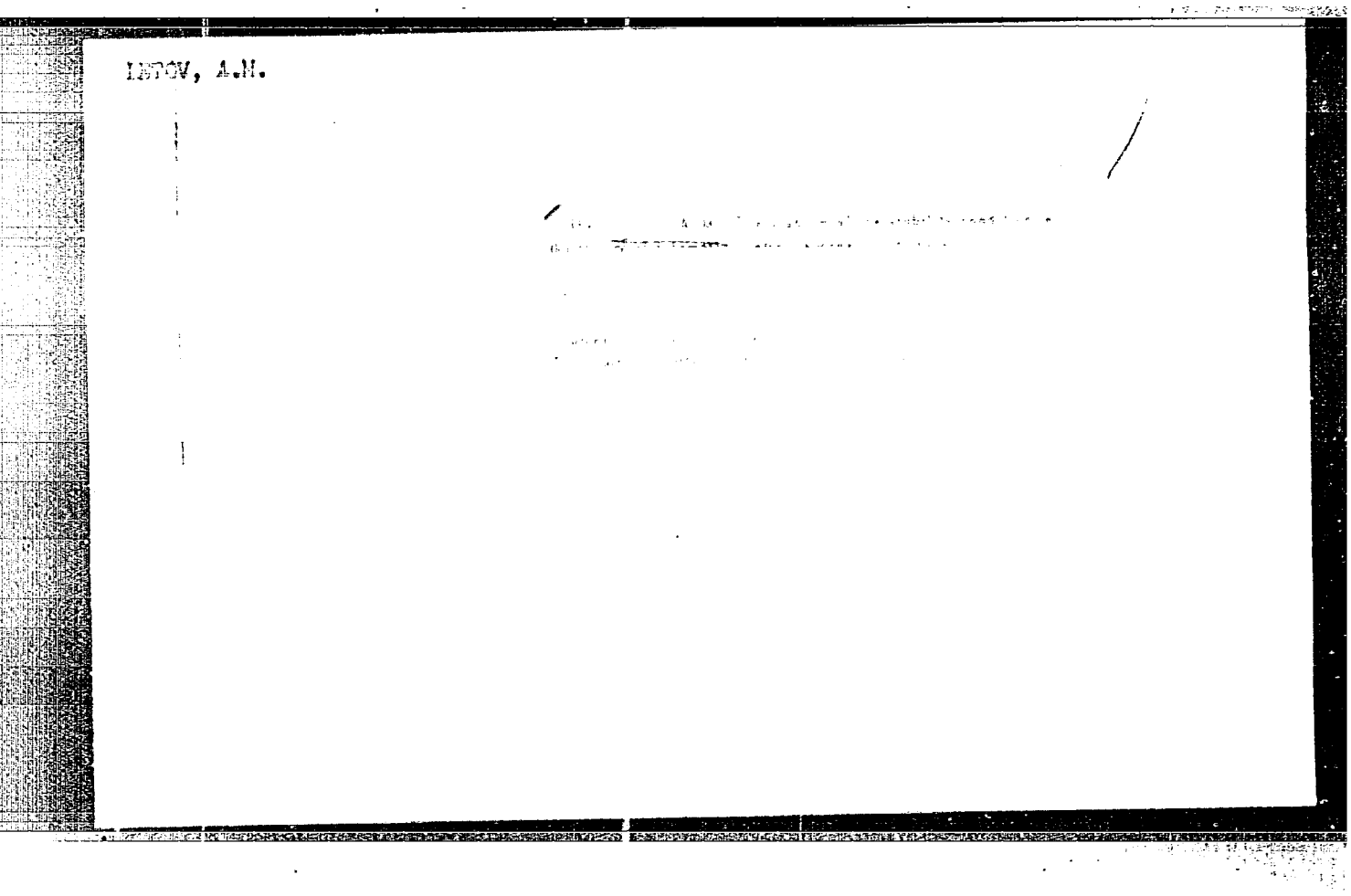
[Transactions of the Second All-Union Conference on the Theory of Automatic Control. Trudy vtorogo Vsesoiuznogo soveshchaniia po teorii avtomaticheskogo regulirovaniia. Moskva. Vol.2 [Problem of quality of dynamic precision in the theory of automatic control] Problema kachestva i dinamicheskoi tochnosti v teorii avtomaticheskogo regulirovaniia. 1955. 536 p. [Microfilm] (MLRA 9:1)

1. Akademiya nauk SSSR. Institut avtomatiki i telemekhaniki. 2. Chlen-korrespondent AN SSSR (for Petrov and Trapeznikov) (Automatic control) .

AYZERMAN, M.A., dokt. tekhn. nauk, redaktor; VORONOV, A.A., kandidat tekhn. nauk, redaktor; KOGAN, B.Ya., kandidat tekhn. nauk, redaktor; KOTEL'NIKOV, V.A., kandidat tekhn. nauk, redaktor; LETOV, A.M., dokt. fiz.-mat. nauk, redaktor; LOSSIYEVSKIY, V.L., dokt. tekhn. nauk, redaktor; KHRAMOY, A.V., kand. tekhn. nauk, redaktor; TRAPEZNIKOV, V.A., redaktor; MEYEROV, M.V., dokt. tekhn. nauk, redaktor; NAUMOV, B.N., redaktor; PETROV, B.N. redaktor; SOLODOVNIKOV, V.V., dokt. tekhn. nauk, redaktor; TSYPKIN, Ya.Z. dokt. tekhn. nauk, redaktor PEVZNER, R.S., tekhn. redaktor.

[Proceedings of the Second All-Union Conference on the Theory of Automatic Control.] Trudy Vtorogo Vsesoiuznogo soveshchaniia po teorii avtomaticheskogo regulirovaniia. Moskva, Izd-vo Akad. nauk SSSR. [Vol. 1 Problem of continuous and periodic operations in the theory of automatic control] Vol.1 Problema ustoichivosti i periodicheskikh rezhimov v teorii avtomaticheskogo regulirovaniia. 1955. 603 p. (MLRA 8:8)

1. Chlen korrespondent AN SSSR (for Trapeznikov, Petrov) 2. Akademiya nauk SSSR. Institut avtomatiki i telemekhaniki.



SUBJECT USSR/MATHEMATICS/Differential equations CARD 1/4 PG - 53
AUTHOR LETOV A.M.
TITLE The stability of instationary motions in control systems.
PERIODICAL Priklad. Mat. Mech. 19, 257-264 (1955)
reviewed 6/1956

The author considers a control system the motions of which are described by the equations

$$\dot{\eta}_k = \sum_{j=1}^{n} b_{kj}\eta_j + n_k\xi \quad , \qquad \dot{\xi} = f(\sigma)$$

(1)

$$\dot{\sigma} = \sum_{j=1}^{n} p_j\eta_j - \xi \qquad (k=1,\ldots,n).$$

Here η_k are the generalized coordinates of the object of control, $f(\sigma)$ a unique, bounded function which is continuous except perhaps for $\sigma = 0$ and with $\sigma f(\sigma) > 0$ for $\sigma \neq 0$. ξ is the coordinate of the control mechanism. For constant b_{kj}, n_k and p_j the stability of such systems has been investigated in detail by Lurje, Malkin and others. The author is interested in the case that b_{kj} and n_k are given functions of the time t in $0 \leq t < T$

(T positive or T = + ∞) and asks for conditions for the functions $p_j(t)$ which guarantee, for arbitrary f and arbitrary perturbations, the stability within a certain domain R (the notion of absolute stability is rigorously defined). For this purpose he transfers the system (1) in two steps:
1) If it is put

$$\xi = \sum_{j=1}^{n} p_j \eta_j - \sigma$$

and ξ eliminated from (1), then with new notations the system

$$(2) \qquad \dot{\eta}_k = \sum_{j=1}^{n} \overline{b_{kj}}\, \eta_j + \overline{n}_k \sigma , \qquad \dot{\sigma} = \sum_{j=1}^{n} \overline{p}_j \eta_j - \overline{\varrho}\sigma - f(\sigma)$$

is obtained.
2) Let

$$F^2 = \sum_{j=1}^{n} a_{ij} \eta_i \eta_j$$

be a real positive definite quadratic form with constant coefficients, which satisfies the Sylvester conditions, ϱ an arbitrary positive real number. Then new coordinates are introduced:

$$(3) \qquad \sum_{k=1}^{n} a_{ik} \eta_k = v \sqrt{a_{ii}}\, \zeta_i , \quad \sigma = \frac{v}{\varrho} \zeta , \quad v^2 = F^2 + \varrho^2 \sigma^2 \qquad (i=1,\ldots,n).$$

This is a continuous one-to-one transformation which can be dissolved to the former coordinates. By differentiation and elimination of the former coordinates n + 2 equations for V, $\zeta, \zeta_1, \ldots, \zeta_n$ are obtained. The system possesses an intermediate integral of the form

$$\sum A_{rs} \zeta_r \zeta_s + \zeta^2 = 1 \tag{4}$$

which represents, since all the A_{rs} are positive, an ellipsoid. The quantity V can be considered as a non-euclidean metric of the space of the $\eta_1, \ldots, \eta_n, \sigma$ and is equal to the square of the length of the vector from the origin to the image point $M(\eta_1, \ldots, \eta_n, \sigma)$. The ζ_k are the direction coefficients of this vector. Now the image point M in the phase can be considered in order to obtain conclusions concerning the stability of (1). It follows that a necessary and sufficient condition for the stability of (1) is that a certain function W on (4) only takes positive values. Therefore it is sufficient that the Hurwitz or Sylvester inequalities for certain determinants are satisfied. The function W is of the form

$$W = \sum_{s,r=1}^{n} B_{sr} \zeta_s \zeta_r + 2 \sum_{s=1}^{n} q_s \zeta_s \zeta + H\zeta^2 ,$$

where B_{sr}, Q_s and H are definite functions of the coefficients of (1) and of F.
For the example

$$T^2 \ddot{\psi} + U \dot{\psi} + K \psi + \eta = 0, \qquad \dot{\eta} = f(\sigma),$$

$$\sigma = a \psi + E \dot{\psi} + g^2 \ddot{\psi} - \frac{1}{l}$$

with variable coefficients the author carries out all the calculations and finds the boundary of stability to be a parabola, situated in the first quadrant, which doubly touches the axes of the coordinates.

LETOV, A. M. Prof.

"The Stability of Control Systems with Delayed Feed Back," a paper read at the Convention on Control Technique, Heidelberg, 24-29 Sep 56.

Inst. Automatics and Telemechanics, Moscow

LETOV, A. M.

"Application of Direct Methods of A. M. Lyapunov in the Theory of Automatic Control." A paper given at the conference on Control Technology, Modern Theory and Its Applications, Heidelberg, 25 to 29 September 1956.

LETOV, A. M. (Prof.); LUR'YE, A. I. (Prof.)

"Theory of Stability of Non-linear Systems of Automatic Regulation,"

paper read at the Session of the Acad. Sci. USSR., on Scientific Problems of Automatic Production, 15-20 October 1956.
Avtomatika i telemekhanika , no. 2, p. 182-192, 1957.

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KHRAMOY, Aleksandr Vladimirovich; LETOV, A.M., otvetstvennyy redaktor; BULGAKOV, A.A., redaktor izdatel'stva; KISELEVA, A.A., tekhnicheskiy redaktor

[Historical sketch of the development of automatic control in the U.S.S.R.; prerevolutionary period] Ocherk istorii razvitiia avtomatiki v SSSR; dooktiabr'skiy period. Moskva, Izd-vo Akademii nauk SSSR, 1956. 219 p. (MLRA 9:11)
(Automatic control)

TOPCHIYEV, A.V., akademik, glavnyy redaktor; PETROV, B.N., otvetstvennyy redaktor; AYZERMAN, M.A., redaktor; BERNSHTEYN, S.I., redaktor; VASIL'YEV, B.V., redaktor; IVANOV, V.I., redaktor; KARAGODIN, V.M., redaktor; KOGAN, B.Ya., redaktor; LETOV, A.M., redaktor; PORTNOV-SOKOLOV, Yu.P., redaktor; SOLODOVNIKOV, V.V., redaktor; ULANOV, G.M., redaktor; TSUPKIN, Ya.Z., redaktor; KRUTOVA, I.N., redaktor; ASTAF'YEVA, G.A., tekhnicheskiy redaktor

[A session of the Academy of Sciences of the U.S.S.R. on scientific problems in automatization of production, October 15-20, 1956; principal problems of automatic control] Sessiia Akademii nauk SSSR po nauchnym problemam avtomatizatsii proizvodstva, 15-20 oktiabria 1956 g.; osnovnye problemy avtomaticheskogo regulirovaniia i upravleniia. Moskva, 1957. 334 p. (MLRA 10:5)

1. Adakemiya nauk SSSR. 2. Chlen-korrespondent AN SSSR. (for Petrov) (Automatic control)

[redacted]

[illegible]ity and quality of nonlinear automatic control [illegible]. Zbirnyk nauki: Tekh. nauki no.1:7-43 '57. (MLRA 10:9)
(Automatic control)

SUBJECT USSR / PHYSICS CARD 1 / 2 PA - 1995
AUTHOR LETOV,A.M., NAUMOV,B.N., RACEEV,V.A., CYPKIN,JA.Z.
TITLE The Congress on Automatic Control Held at Heidelberg (German Federal Republic).
PERIODICAL Avtomatika i telemechanika 18, fasc.1, 93-96 (1957)
Issued: 2 / 1957

This congress took place from the 25.9.1956 to the 29.9.1956 at Heidelberg and was organized by the department for control technics (president Dr.Grebe) of the Society of German Electrotechnic/Engineering (VDE/VDI). The congress was attended by scientists of international repute. Most of the participants, practicians and theoreticians came from Western Germany. The USSR was represented by a delegation of the Institute for Automatics and Telemechanics of the Academy of Science in the USSR under the leadership of A.M.LETOV. The Soviet delegation had the following instructions: a) to take part in the congress, b) to establish contact with foreign scientists taking part in the congress as well as with technical engineering circles, c) to visit several firms. Soviet cooperation in the congress consisted in: a) lectures held by Soviet delegates, answering as well as asking questions in the course of discussions, b) participation in discussions concerning lectures delivered by delegates of other countries.

Organisation and work performed by the congress are both described as being good. The texts of the total of about 70 original lectures were submitted to the organizing committee already before the congress was opened; they were

103-7-1/11

AUTHOR: LETOV A.M.

TITLE: Conditionally Stable Control Systems (concerning a Certain Type of Optimum Controllable Systems).
(Uslovno ustoychivyye reguliruyemyye sistemy(ob odnom klasse optimal'nykh reguliruyemykh sistem)-Russian)

PERIODICAL: Avtomatika i Telemekhanika,1957,Vol 18, Nr 7, pp 601-614 (U.S.S.R.)

ABSTRACT: A strictly linear system of an automatic control is investigated the condition of which is given by the vector $x = x(x_0,t)$ and which is asymptotically stable in relation to the obvious solution $x \equiv 0$. The author assumes that the system parameters were selected and fixed according to any existing conception of the optimum of a linear system. He also assumes that t^* is the time of the dependent fading of a transition process i.e. such a number for which the condition $|x(x_0,t)| \leqslant x_0 e^{-\pi}$ is fulfilled in the case of random $t \geqslant t^*$. The authors maintains that such a t^* $(0<t_4<t^*)$ exists for which the switching of the velocity ξ of the executing organ of $+\xi$ in the case of $t \leqslant t_4$ to $-\xi$ in the case of $t \geqslant t_4$ changes the initial system into another conditionally stable one (in the case of $t \geqslant t_4$). This is of such a kind that its transition process fades with the first oscillation and the time of the dependent fading of the transition process is essentially smaller than t^*. A control method is proposed which includes the determination of t^* (time of switching) in dependence on the initial con-

Card 1/2

Conditionally Stable Control Systems (Concerning a Certain Type of Optimum Controllable Systems). 103-7-1/11

dition $x_o = x(x_o,0)$ as well as on the parameters of the system. The determination of the time t_* is carried out by means of a special method of calculation the structure of which is analysed here.
(6 illustrations and 8 Slavic references).

ASSOCIATED Not Given.
PRESENTED BY
SUBMITTED 26.2.1957
AVAILABLE Library of Congress.
Card 2/2

LETOV, A. M.

"Problems of Quality for Automatic Control Systems and Quadrature Metric."

reports presented at 13 Annual Instruments and Automation Exhibit and Conference, Philadelphia, 15-19 Sep 58.

Comments: B-3,115,266

LETOV, A. M.

103-2-8/9

AUTHORS: Letov, A. M., Naumov, B. N.

TITLE: International Federation for Automatic Control (IFAK) (Mezhdunarodnaya federatsiya po avtomaticheskomu upravleniyu (IFAK))

PERIODICAL: Avtomatika i Telemekhanika, 1958, Vol. 19, Nr 2, pp. 189-191 (USSR)

ABSTRACT: In September 1956 the International Congress for Automation took place at Heidelberg. The congress was called by the group for control engineering of the VDI/VDE (Society of German Engineers, Düsseldorf). 1000 representatives from 18 countries were present. A short survey is given on the preparatory works for the foundation of the IFAC and then a short report is also given on the meeting of the preparatory committee of the IFAC, which took place from September 9th to 10th, 1957. The report also covers the meetings of the General Assembly on September 10th, 11th and 12th, 1957, as well as the first meeting of the executive committee of this society.

Card 1/2

Letov, 1114

AUTHORS: Letov, A. M., Professor, 30-1-27/39
Naumov, B. N., Candidate of Technical Science

TITLE: General Meeting of the International Federation for Automatic Control (IFAC) (General'naya assamblyea Mezhdunarodnoy federatsii po avtomaticheskomu upravleniyu (IFAK)

PERIODICAL: Vestnik AN SSSR, 1958, Vol. 28, Nr 1, pp. 106-108 (USSR)

ABSTRACT: This general meeting took place in Paris from September 10 - 12, 1957. The idea of creating such a federation came from the American scientist R. Oldenburg who suggested it at the International Congress at Heidelberg (German Federal Republic) in September 1956. A committee for preparatory works was then elected which worked out the articles of the IFAC. There were two more meetings of this preparatory committee: on April 25 - 27, 1957 in Düsseldorf and on September 9 - 10, 1957 in Paris. A general meeting elected the following executive committee: President - G. Chestnat (USA), First Vice-President - A. M. Letov (USSR), Second Vice-President - V. Broyda (France), General Secretary - G. Ruppel (German Federal Republic), Lemon (France), P.

Card 1/2

General Meeting of the International Federation for Automatic Control (IFAC) 30-1-26/39

Novatskiy (Poland), Gerike (Switzerland), Koals (England), Tsyan' Syue - sen' (China), Evangelisti (Italy), Aymbinder (Belgium). The meeting decided to convene the First International Congress of the IFAC to Moscow in 1960. The Executive Committee discussed the program of this first congress as well as the formation of a group of consultants on scientific problems. The design of the program of this congress to come provides 3 directions of work: theory and methods of automatic control, technical means of automation and new industrial application (including the application of computers.)

AVAILABLE: Library of Congress

1. Automation-Conference

Card 2/2

LETOV A. M.

30-1-36/39

AUTHOR: Ostianu, V. M.

TITLE: Problems in the Theory of Relay Devices (Problemy teorii releynykh ustroystv).
All-Union Conference in Moscow (Vsesoyuznoye soveshchaniye v Moskve).

PERIODICAL: Vestnik AN SSSR, 1958, Vol. 28, Nr 1, pp. 131-132 (USSR).

ABSTRACT: The Institute for Automation and Remote Control AN-USSR convened a Conference which took place from October 3 to October 9 1957. The following problems figured on the agenda: Synthesis, analysis, reconstruction of the relay structure and effect, the best construction and structure, automation of analytical processes, etc: The council was attended by representatives of scientific institutions and industrial firms, as well as by scientists from other countries. The following reports were made:

1) A. M. Letov stressed the importance of the part played by relay devices in the automation of the finishing process.
2) M. A. Gavrilov characterized the present stage and the main trends of the development of these devices, and said that with respect to works published in this field, the USA and the USSR ranged first, while the Rumanian Peoples' Republic ranged third.
3) S. A. Yanovskaya investigated the characteristic features of the

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Problems in the Theory of Relay Devices. 30-1-36/39
All-Union Conference in Moscow

development of mathematical logics as well as the fields of their technical application.

4) G. K. Moisil, Regular Member of the Roumanian Academy, stressed the influence exercised by Soviet scientists (V. I. Shestakov, M. A. Gavrilov) on the development in his country.
5) A. A. Markov spoke about the inversion of complicated systems of functions.
6) A. Svoboda (Czechoslovakia): His report on certain possibilities of using contact grids was read.
7) Yu. A. Bazilevskiy: On temporary logical functions.
8) K. Popovich (Roumania) suggested an improved representation of functions.
9) A. V. Kuznetsov: On the impossibility of constructing an algebraic apparatus with a finite number of functions.
10) S. V. Yablonskiy: On the application of the existing theory for new elements with relay effect.
11) T. L. Maistrova: On the application of non-equivocal logics.
12) G. K. Moisil: His report on the synthesis of relay schemes was read.
13) M. A. Gavrilov: Investigated methods of Constructing bridge circuits.

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Problems in the Theory of Relay Devices.
All-Union Conference in Moscow.

14) P. Konstantinenku (Roumania): On the method of constructing multipole contacts.
15) V. M. Roginskiy: On the graphic method of constructing (I,k)-poles.
16) A. D. Kharkevich: On the application of the methods of probability diagrams.
17) V. I. Shestakov: On the algebraic method of analysis and synthesis.
18) Ya. I. Kekler: On the graphic method of the construction of relay contact schemes.
19) V.G. Lazarev: On the method of determining the minimum relay number.
20) M. Nadelku (Roumania): On electronic circuits with relay effect. G. Manin.
21) L. Kalmar, Corresponding Member of the Hungarian Academy of Science: On the logical Seged machine.
22) F. Svoboda (Czechoslovakia): On the working principle of a machine for the synthesis of contact circuits.
23) A. A. Arkhangelskaya: On a machine for the synthesis of contact poles.

Problems in the Theory of Relay Devices.
All-Union Conference in Moscow.

30-1-36/39

V. G. Lazarev.
V. M. Roginskiy.

24) P. P. Parkhomenko. On problems concerning the automation of the analysis of relay schemes.
T. T. Soukanov.

The extent to which the field of the theory of devices with relay effect has been investigated is described as insufficient. In connection with the council an exhibition of devices and publications dealing with this field was organized.

AVAILABLE: Library of Congress.

1. Automation-Conference 2. Scientific reports-USSR

Card 4/4

LETOV, A.M., doktor fiziko-matematicheskikh nauk; NAUMOV, B.N., kand. tekhn.nauk

Second conference of the Executive Committee of the International Federation for Automatic Control. Vest. AN SSSR 28 no. 6:95 Je '58. (MIRA 11:7)

(Zurich--Automatic control--Congresses)

SOV/24-59-3-5/33

AUTHOR: Letov, A. M. (Moscow)

TITLE: The Response Problem for Nonlinear Automatic Systems of Quadratic Metric.

PERIODICAL: Izvestiya Akademii nauk SSSR, Otdeleniye tekhnicheskikh nauk, Energetika i avtomatika, 1959, Nr 3, pp 25-31 (USSR)

ABSTRACT: The paper presents a method of solving the response problem for such systems. Section 1 deals with the approach to be adopted; Eq (1.1) is the set of equations for the perturbed motion of the system within a region N of a euclidean space E_n whose metric is R^2; it applies to a time t in the range 0 to T. The x_k are the generalized coordinates, the $b_{k\alpha}$ are parameters, and the f_k are nonlinear functions that satisfy the conditions (1.2), and the conditions that they are known and bounded within N, including therein the origin, and that there are positive numbers L_k such that $|f_k(x_1, \ldots x_n, t)| < L_k^{(N)} R$ everywhere within N for t in the range $[0, T]$. The $b_{k\alpha}$ are in general functions of t and are defined in the range $[0, T]$, where T is positive or ∞. Further, it is assumed that

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at any point $M(x_{10},\ldots x_{no})$ within N the set (1.1) has a unique solution, and that set (1.1) contains numerical parameters $p_1,\ldots p_m$, which may appear in the $b_{k\alpha}$ and in the f_k; and which may be adjusted. The number m of such parameters equals the number of dimensions of the space P within which the response is studied. Two aspects of the response are dealt with.

1. A time t^* governed by (1.3) is specified for a region B in P (in B the system is stable; a is positive.

2. A subregion B' in B is to be found, for which $t^* \leq t^{**}$ (preset).

The subsequent development in sections 2 and 3 is straightforward. Section 4 deals with the special case of a strictly linear system; the usual results are reached.

Section 5 deals with the damping, and a theorem is

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formulated (but not proved): the response is best at that point within B at which W is greatest on the surface of (3.1) when $\lambda_1(t)$ is minimal. An example, dealt with in detail elsewhere by the author, is considered at the end. The paper contains 17 references, of which 10 are Soviet and 7 English.

SUBMITTED: April 3, 1959.

LETOV, A.M.; PETROVSKIY, A.M.

Session of the executive council of the International Federation on Automatic Control and its consultation committee, held in Rome, March 2-6. Vest. AN SSSR 29 no.6:112 Je '59. (MIRA 12:5)
(Automatic control)

S/103/60/021/04/01/007
B014/B014

AUTHOR: Letov, A. M. (Moscow)

TITLE: Analytical Design of Controllers. I

PERIODICAL: Avtomatika i telemekhanika, 1960, Vol. 21, No. 4, pp. 436-441

TEXT: The author first mentions the two classes of problems arising in the theory of optimum control systems. The first class embraces all the systems warranting the most favorable modes of operation, whereas the second class includes the systems having the best transients. A combination of the two classes is regarded as an optimum in automatic control. In the article under review, the author describes the analytical design of optimum systems that are defined within an "open" range. The following part deals with the analytical design of a closed control system. The author proceeds from equations (2.1) which describe the disturbed motion of an object. It is necessary to find an analytical form of the regulation law (2.5) that offers a stable system together with (2.1), and reduces the integral (2.3) to a minimum. This integral (2.3) serves as a criterion for the quality of a system. The problem is solved with

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S/103/60/021/05/02/019
B007/B011

AUTHOR: Letov, A. M. (Moscow)

TITLE: Analytical Design of Controllers. 2

PERIODICAL: Avtomatika i telemekhanika, 1960, Vol. 21, No. 5, pp. 561 - 568

TEXT: The problem of the analytical design of controllers according to the given optimizing functional is solved here. First, the author investigates optimum systems defined in a closed area. In all systems of automatic control the restriction of the deviation ξ of the control member $|\xi| \leq \bar{\xi}$, formula (1.1), is of basic importance. A closed control system in which the disturbed motion of the control object is given by formula (1.3) is investigated. All designations in this formula have the same meaning as in the author's paper of Ref. 1. Formula (1.3) is assumed to be defined jointly with the sought equation of the controller in the closed area $\bar{N}$ (which is marked by formula (1.1)). The natural boundary conditions in this field, formula (1.4), are written down, and

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formula (1.5) is chosen as a criterion for the optimum. Such steady functions of $\xi, \eta_1, \ldots, \eta_n$ of the C-class (allowing discontinuities of the first derivatives) are sought as assign the smallest value to the interval (1.5). The problem formulated in this manner belongs to the so-called unsteady problems of the calculus of variations. For the purpose, use is made of the methods of the classical calculus of variations completed by a procedure of nonlinear transformation that had been used for the optimum problems of 1st class (Ref. 1) in the paper of Ref. 2. The author's attention was drawn to this transformation by I. A. Litovchenko. The solution to the problem is then obtained by investigating the case of restriction (1.1) and by assuming $\xi = \varphi(\zeta)$, formula (2.1). The function $\varphi(\zeta)$ is defined by formula (2.2). The transformation (2.1) and (2.2) turns the closed area $\bar{N}$ into an open area N, and allows the methods of the calculus of variations to be applied to the solution of ordinary Lagrange problems. The only peculiarity in this solution consists in the checking as to whether the conditions by Weierstrass-Erdman made on the points of discontinuity of the derivatives are satisfied. Formula (2.6) is the equation

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LETOV, A.M.

Address of the president of the International Federation of Automatic Control. Avtom.i telem. 21 no.6:659-660 Je '60. (MIRA 13:7)

1. President Mezhdunarodnoy Federatsii po avtomaticheskomu upravleniyu (IFAK). (Automatic control)

S/103/60/021/06/01/01
B012/B054

AUTHOR: Letov, A. M. (Moscow)

TITLE: Analytical Design of Controllers. 3

PERIODICAL: Avtomatika i telemekhanika, 1960, Vol. 21, No. 6, pp. 661 - 665

TEXT: The author describes the analytical design of a controller in consideration of a limited servomotor speed. The problem had been dealt with briefly in the author's papers of Refs. 1,2. Here, the author investigates a closed automatic control system in which the disturbed motion is expressed by equations (1.1). Required is the function $f(\sigma)$ as well as the argument of the function $\sigma = \sigma(\eta_1, \ldots, \eta_n, \xi)$. Functional (1.3) is investigated as a criterion of the optimum. Required are such continuous functions of ξ, $\eta_1, \ldots, \eta_n$ of the C_1 class as satisfy equations (1.1) and the boundary conditions (1.5) which give the minimum value to functional (1.3). Equations (1.1) are defined in an open region $N(\xi, \eta_1, \ldots, \eta_n)$, the problem thus formulated appearing as an ordinary

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Lagrangian variation problem. The process of its solution is known; the required equations are written down in the form of (1.7). The solution of the problem is studied for two cases of the last equation of the system (1.7): at the left and right ends of the optimum curve. Finally, formula (3.12) is derived for the controller. Two problems are formulated on the basis of the explanations given. N. N. Krasovskiy advised the author. There are 3 Soviet references.

LETOV, A.M.; NESMEYANOV, A.N.; CHESTNAT, G.,(Soyedinennye Shtaty Ameriki); U ZHE-YAN [Wu Jê-yang]

From addresses delivered at the opening of the Congress. Nauka i zhizn' 27 no.10:2 O '60. (MIRA 13:10)

1. Prezident Mezhdunarodnoy federatsii po avtomaticheskomu upravleniyu (for Letov). 2. Prezident AN SSSR (for Nesmeyanov). 3. Byvshiy prezident Mezhdunarodnoy federatsii po avtomaticheskomu upravleniyu (for Chestnat). 4. Assotsiatsiya po avtomatike, Kitayskaya Narodnaya Respublika (for U Zhe-yan).
(Automatic control)

LETOV, A.M., professor

First International Congress on Automatic Control. Vest.AN SSSR 30 no.9:13-17 S '60. (MIRA 13:9)

1. President Mezhdunarodnoy federatsii po avtomaticheskomu upravleniyu.
(Automatic control--Congresses)

Letov, Aleksandr Mikhaylovich

Stability in Nonlinear Control Systems. Princeton, N.J., Princeton Univ. Press, 1961.

316 p. Diagrs.

Translated from the original Russian: Ustoychivost' Nelineynykh Reguliruyemykh Sistem, Moscow, 1955.

Bibliographical footnotes.

TRAPEZNIKOV, V.A., akademik, glav. red.; AYZERMAN, M.A., doktor tekhn. nauk, red.; AGEYKIN, D.I., kand. tekhn. nauk, red.; ARTOBOLEVSKIY, I.I., akademik, red.; BATRACHENKO, L.P., inzh., red.; VORONOV, A.A., doktor tekhn. nauk, red.; GAVRILOV, M.A., doktor tekhn. nauk, red.; DIKUSHIN, V.I., akademik, red.; KARIBSKIY, V.V., kand. tekhn. nauk, red.; KOGAN, B.Ya., kand. tekhn. nauk, red.; KRASIVSKIY, S.P., red.; KULEBAKIN, V.S., akademik, red.; LERNER, A.Ya., doktor tekhn. nauk, red.; LETOV, A.M., kand. tekhn. nauk, red.; MEYEROV, M.V., doktor tekhn. nauk, red.; PETROV, B.N., akademik, red.; PUGACHEV, V.S., doktor tekhn. nauk, red.; SOTSKOV, B.S., red.; STEFANI, Ye.M., kand. tekhn. nauk, red.; KHRAMOY, A.V., kand. tekhn. nauk, red.; TSYPKIN, Ya.Z., doktor tekhn. nauk, prof., red.; CHELYUSTKIN, A.O., kand. tekhn. nauk, red.; CHILIKIN, M.G., doktor tekhn. nauk, red.; NAUMOV, B.N., kand. tekhn. nauk, red.; KASHINA, P.S., tekhn. red.

[Transactions of the International Federation of Automatic Control, 1st International Congress, Moscow, 1960] Trudy I Mezhdunarodnogo kongressa Mezhdunarodnoi federatsii po avtomaticheskomu upravleniiu. Moskva, Izd-vo Akad. nauk SSSR. Vol.2. [Theory of discrete systems, optimal systems, and adaptive automatic control systems] Teoriia diskretnykh, optimal'nykh i samonastraivaiushchikhsia sistem. 1961. 996 p. (MIRA 14:9)

1. International Federation of Automatic Control, 1st International Congress, Moscow, 1960. 2. Chlen-korrespondent AN SSSR (for Sotskov) (Automatic control)

21794

S/103/61/022/004/001/014
B116/B212

16.9500 (1031, 1121, 1132)

AUTHOR: Letov, A. M. (Moscow)

TITLE: Analytic design of controllers. IV

PERIODICAL: Avtomatika i telemekhanika, v. 22, no. 4, 1961, 425-435

TEXT: The present paper is a continuation of three former articles of the author dealing with the same problem (Avtomatika i telemekhanika, v. 21, no. 4, 5, 6, 1960). In them, the representation of the control function as a known function of coordinates of a system has been called "analytic design". This controller design using an analytic method has been formulated as a classical calculus of variations, where the automatic control function is determined in agreement with a certain previously assumed optimizing functional. In the present paper, the same task of controller design is solved analytically. The controllers are optimized according to the integral square error, using the method of dynamic programming of R. E. Bellman, J. Glicksberg, and O. A. Gross (Ref. 8: Some Aspects of the Mathematical Theory of Control Processes. Report no. 313, 1959, RAND Corporation). It is shown that this method will yield the same results as obtained in earlier

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Analytic design ...

papers. Here, it is also shown how the optimum solution is obtained for a closed area N for continuous functions y(t), and in a following article, the same solution will be presented for continuous functions x(t) and discontinuous functions y(t). With the help of the method of dynamic programming, the control function can be obtained at once in that form where it is usually realized with sensitive elements, transformers, amplifiers, and a servomotor. N. N. Krasovskiy has pointed out that the functional interpreted by the author as an integral square error

$$I(\xi) = \int_0^\infty V\,dt \qquad (4.2),$$ where

$$V = \sum_k a_k \eta_k^2 + c\xi^2 \qquad (4.3),$$

is a certain positive quadratic form which, under certain conditions, might be regarded as a Lyapunov function. R. E. Kalman and T. Ye. Bertram referred to the same fact (Control System Analysis and Design Via the Second Method of Lyapunov; Journal of Basic Engineering, June 1960). The method of dynamic programming allows to solve simultaneously the optimizing problem of the system according to (4.2) and the stability problem of the

Analytic design ...

optimum system. The author thanks Ye. A. Barbashin and N. N. Krasovskiy for suggestions. There are 20 references: 16 Soviet-bloc and 4 non-Soviet-bloc. The references to English-language publications read as follows: La Sall I. P. Time Optimal Control Systems. Proc. National Ac. Sci., vol. 45; Desoer C. A. The Bong-Bong Servo Problem, Treated by Variational Technique Information and Control, vol. 2, 1959.

SUBMITTED: November 4, 1960

Card 3/3

LETOV, A.M.

Review of Richard Bellman's book "Adaptive control processes; a guided tour." Avtom. i telem. 22 no.12:1694-1697 D '61. (MIRA 14:12)

(Automatic control)

PHASE I BOOK EXPLOITATION SOV/6302

Letov, Aleksandr Mikhaylovich

Ustoychivost' nelineynykh reguliruyemykh sistem (Stability of Nonlinear Control Systems) 2d ed. rev. and enl. Moscow, Fizmatgiz, 1962. 483 p. 10,000 copies printed.

Ed.: A. N. Rubashov; Tech. Ed.: L. V. Likhacheva.

PURPOSE: This book is intended for specialists in automation, and may be used as a textbook by advanced students and aspirants specializing in automatic control and applied mechanics.

COVERAGE: The present book is the second, revised and enlarged edition of this well-known work, which was originally published in 1955. It contains new derivation methods for the Lyapunov function, which are reducible to an algorithm applicable to engineering calculations, and includes analyses of a series of new stability problems, which are based on specific physical interpretations. The author thanks A. I. Lur'ye, Ye. A.Barbashin,

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N. N. Krasovskiy, B. S. Razumikhin, V. V. Rumyantsev, Ye. N. Rozenvasser, and V. A. Troitskiy. There are 113 references (given in footnotes): 90 Soviet, 12 English, 7 German, 2 Rumanian, 1 French, and 1 Dutch.

TABLE OF CONTENTS:

S/025/62/000/011/002/005
D222/D308

AUTHOR: Letov, A.M., Professor, Doctor of Physical and Mathematical Sciences

TITLE: Automation in cosmic navigation

PERIODICAL: Nauka i zhizn', no. 11, 1962, 28-29

TEXT: The technological problems raised by the extreme requirements of accuracy in inertial and inter-stellar navigational systems are discussed. The estimated permissible error for successful return from a distance of 1 light year is 3×10^{-10} degrees.

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